Environmental **T**ransportation **P**lanning, LLC
37 Jackson Avenue, Ponte Vedra Beach, FL 32082
Main Office: 904.273.0788

MEMORANDUM

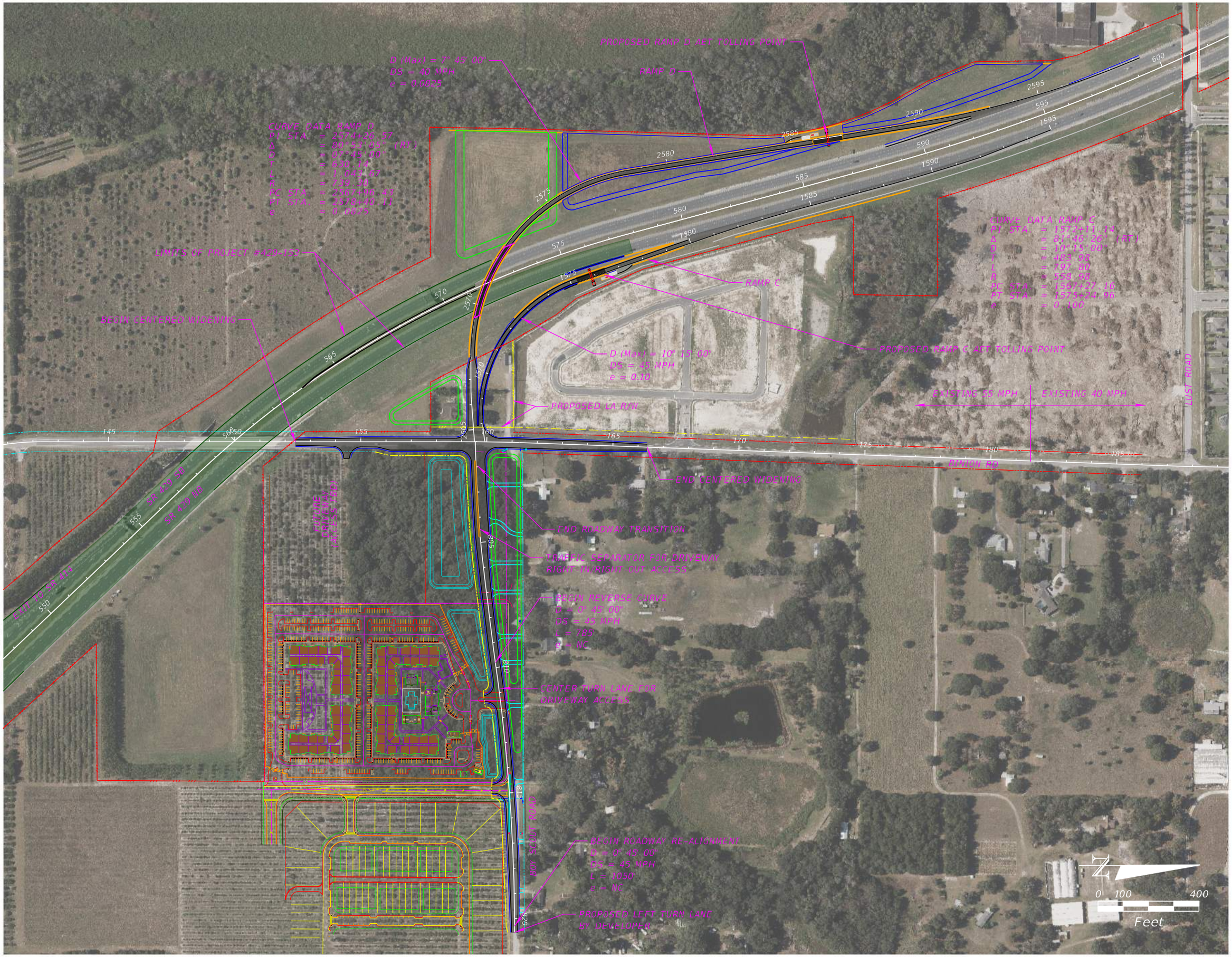
January 16, 2023

To: Greg Seidel, P.E. – The Balmoral Group
Bronce Stephenson – The Balmoral Group
Jonathan Williamson, ACIP – Dewberry Engineers
From: Jason Cornell
Subject: Noise Study Report Addendum
CFX Project #429-309 PD&E Study
SR 429 / Binion Road Interchange
Orange County

The October 2022 Traffic Noise Study Report documented the analysis conducted as part of the PD&E Study. At that time, the selected alternative included a roundabout intersection for Binion Road and Boy Scout Road. After finalizing the report, the roundabout intersection has been replaced with a signalized intersection. A roundabout is still an option presented in the engineering documentation.

The recommended noise barriers were analyzed to abate traffic noise from SR 429. Thus, the change in the intersection design is not anticipated to change the outcome of the barrier results.

The Traffic Noise Study will be re-evaluaed during the project's Design Phase at which time the signalized intersection will be incorporated into the analysis.



SR 429 INTERCHANGE WITH BINION ROAD (RE-ALIGNED BOY SCOUT ROAD SIGNAL ALTERNATIVE)

SR 429 INTERCHANGE WITH BINION ROAD		CENTRAL FLORIDA EXPRESSWAY AUTHORITY	SHEET NO.
ROAD NO.	PROJECT NO.		1
SR 429	N/A		

Traffic Noise Study Report

Daniel Webster Western Beltway

SR 429 / Binion Road Interchange
Project Development and Environment (PD&E) Study
Orange County, Florida
CFX Project No: 429-309

Prepared For:
Central Florida Expressway Authority

Prepared By:
Environmental Transportation Planning, LLC
Ponte Vedra Beach, FL

In Association With:
Dewberry Engineers, Inc.
Orlando, FL

October 2022

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1.0 INTRODUCTION

The Daniel Webster Western Beltway (SR 429) is a 23-mile long, limited-access toll road that extends from Interstate 4 in Osceola County to US 441 in Orange County. Expansion of the Beltway's capacity is underway from Tilden Road to the north of SR 414. The Central Florida Expressway Authority (CFX) is now conducting a Project Development and Environment (PD&E) Study to evaluate a proposed half interchange expressway connection from Binion Road to SR 429. The new interchange and other improvements will provide enhanced access and mobility to southwest Apopka.

1.1 Project Limits

The study area runs along the vicinity of Binion Road and Boy Scout Road at SR 429. The project study area is illustrated in **Figure 1.**

1.2 Purpose and Need

Purpose

A new interchange connection between SR 429 and Binion Road has been identified as a need to provide enhanced access and mobility to southwest Apopka from SR 429 in the vicinity of Binion Road. Currently, vehicles in the vicinity of Binion Road must enter or exit SR 429 by traveling approximately three miles north to just north of US 441 at the SR 429 Connector Road interchange or travel approximately three miles south to the interchange at Ocoee Apopka Road. Therefore, this PD&E Study will analyze and evaluate a proposed half interchange (northbound on-ramp and southbound off-ramp) expressway connection from Binion Road to SR 429. Additional purposes for the project include improved emergency vehicle access to the hospital and supporting economic development.

Need

Six project needs serve as justification for the proposed improvements. These needs are to 1) Provide system linkage; 2) Provide regional connectivity and mobility; 3) Support social and economic needs; 4) Provide consistency with Local and Regional Plans; 5) Accommodate and provide for multi-modal transportation options; and 6) Design a safe intersection at Binion Road & Boy Scout Road.

Environment

Environmental analyses are a critical component of any PD&E study. When evaluating new infrastructure, the potential environmental effects are studied, with multiple evaluations covering the spectrum of natural and human-centered environments.

The objective of this Traffic Noise Study Report is to summarize the traffic noise analysis conducted for the PD&E's preferred build alternative. The analysis identifies the noise sensitive

receptors within the study corridor and evaluates the noise levels predicted to occur due to the proposed project. Sites and communities not specifically identified in **Appendix D** are 1) not within the project limits or 2) are located too far from the adjacent roadways under study to be considered noise sensitive.

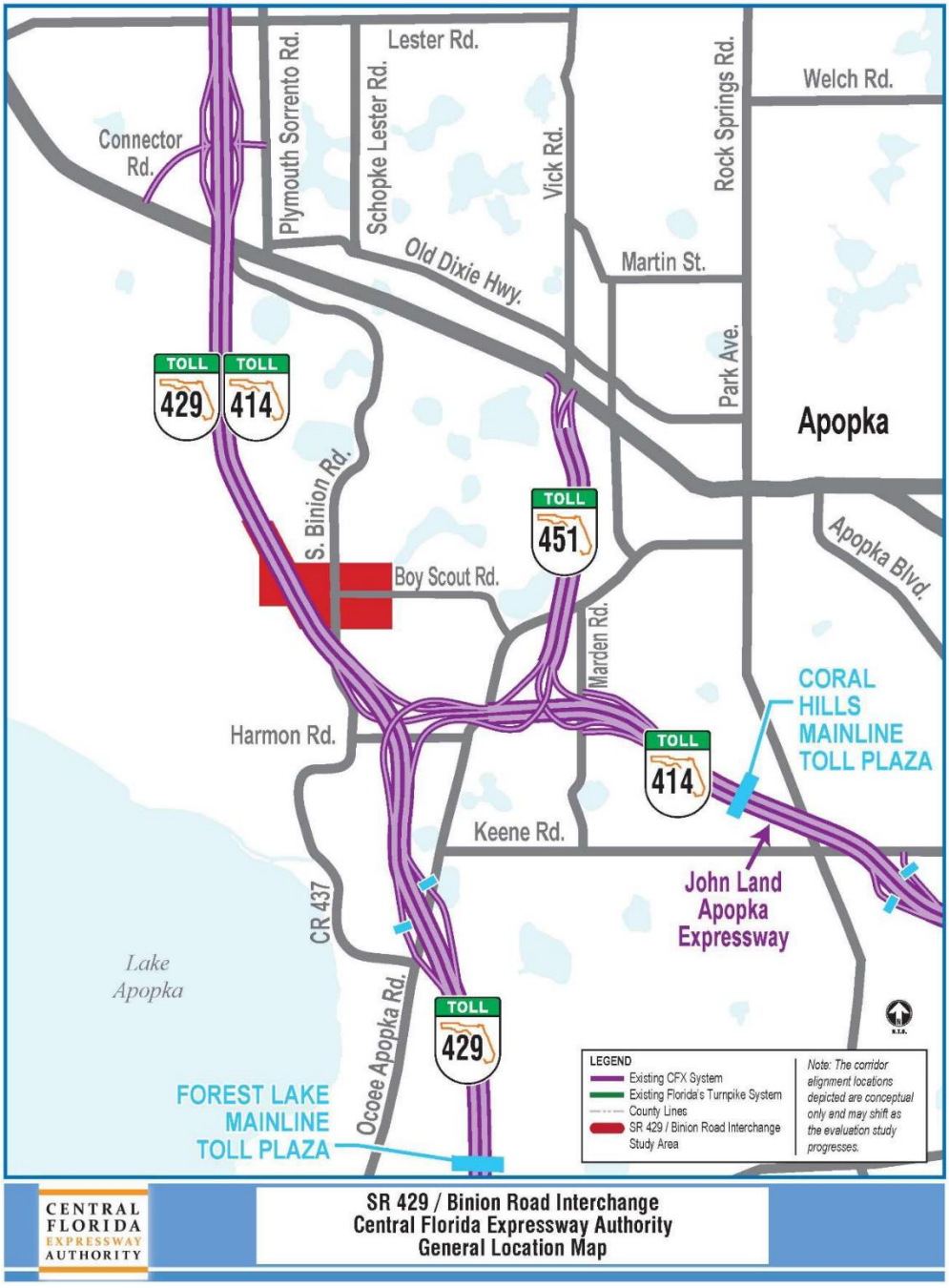
1.3 Build Alternative

The PD&E's preferred build alternative is illustrated in **Appendix A**. Additional engineering detail can be found in the project's Preliminary Engineering Report (PER).

1.4 No-Build Alternative

Consistent with FDOT guidelines, this analysis also considers an alternative that assesses what would happen to the environment in the future if this proposed project was not built. This alternative called the No-Build Alternative consists of the existing roadways within the study area, programmed improvements to existing facilities, and routine maintenance improvements to these facilities. While the No-Build Alternative does not meet project needs, it provides a baseline condition to compare and measure the proposed project's effects.

Figure 1: Project Location Map



2.0 METHODOLOGY

The traffic noise study conducted for this project is consistent with *Code of Federal Regulations* (C.F.R.), Title 23, § 772; Chapter 335, Section 335.17, *Florida Statutes*; Part II, Chapter 18 of the Florida Department of Transportation's (FDOT) *Project Development and Environment Manual*; and Federal Highway Administration's (FHWA) traffic noise analysis guidelines contained in *FHWA-HEP-10-025*. The FHWA Traffic Noise Model (TNM) - version 2.5 was used to predict traffic noise levels for this project. The analysis evaluated noise levels for the existing condition and the 2045 No-Build and Build Alternatives.

Noise receptor coordinates used in the TNM are located in exterior areas where frequent human use may occur, usually at the edge of the residential structure closest to the project roadways, unless the analyst's professional judgment determines otherwise.

Project engineering design files were used to determine the design alternative's location for input into TNM. Roadway elevation data for the study was obtained from the project engineering team. Data for the noise receptors and cross streets were obtained from the United States Geological Survey digital elevation models[1]. Additional receptor elevation data was gleaned from the approved final development plans for the two residential communities adjacent to SR 429.

2.1 NOISE METRICS

Noise is typically defined as unwanted sound. Traffic noise is a combination of noises produced by the engine, exhaust, and tires and is never constant. The noise metric used to describe this combination of noise is called "Leq." This metric allows for the fluctuations of daily traffic noise to be analyzed in terms of steady noise levels with the same acoustic energy, and thus, is the level of constant sound. Constant sound is quantified by a meter that measures units called decibels (dB). For highway traffic noise, an adjustment or weighting of the high and low-pitched sounds is applied to approximate how an average person hears. These adjusted sounds are called "A-weighted decibels" and are expressed as "dB(A)."

2.2 TRAFFIC DATA

Traffic noise is heavily dependent on traffic volume and speed, with the amount of noise generated by traffic increasing as the vehicle speed and number of vehicles increase. Characteristics contributing to the 2045 Design Year's highest traffic noise levels were used to predict project noise levels. Worst-case noise conditions occur with the maximum traffic traveling at the posted speed and represent a Level of Service (LOS) C operating condition. However, if the traffic analysis indicates the roadway will operate below LOS C, the project's Demand peak-hour directional traffic volumes are used per Chapter 18 of the FDOT PD&E Manual. Traffic volumes and speeds used in the analysis are included in **Appendix B**.

[1] USGS, https://apps.nationalmap.gov/lidar-explorer/#/

2.3 NOISE ABATEMENT CRITERIA

Land use plays an important role in traffic noise analyses. To determine which land uses are "noise sensitive," this noise impact analysis used the FHWA Noise Abatement Criteria (NAC). **Table 1** shows these criteria are divided into individual land use activity categories. The FDOT has established noise levels at which noise abatement must be considered for each of these categories, referred to in this report as the FDOT NAC. Another criterion for determining project impacts that warrant abatement consideration occurs when project noise levels are below the NAC but show a substantial increase (15.0 dB(A) or more) over existing levels.

Table 1: Noise Abatement Criteria

Hourly A-Weighted Sound Level-decibels (dB(A))				Description of Activity Category
Activity Category	Activity Leq(h) [1]		Evaluation Location	
	FHWA	FDOT		
A	57.0	56.0	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need; and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[2]	67.0	66.0	Exterior	Residential.
C[2]	67.0	66.0	Exterior	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, daycare centers, hospitals, libraries, medical facilities, parks, picnic areas, golf courses, places of worship, playgrounds, public meeting rooms, public/nonprofit institutional structures, radio studios, recording studios, recreational areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52.0	51.0	Interior	Auditoriums, daycare centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public/nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E[2]	72.0	71.0	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties, or activities not included in A-D or F.
F	-	-	-	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	-	-	-	Undeveloped lands that are not permitted.

(Based on Table 1 of 23 CFR Part 772)

[1] The Leq(h) Activity Criteria values are for impact determination only and are not design standards for noise abatement measures.

[2] Includes undeveloped lands permitted for this activity category.

An illustration of typical exterior and interior noises and their corresponding sound level is presented in **Table 2**. This table gives the reader a better understanding of the noise levels discussed herein. In Florida, noise levels that reach 66.0 dB(A) at Activity Category B and C land use require noise abatement consideration. A 71.0 dB(A) noise level is required for an Activity Category E land use to be impacted by traffic noise.

Table 2: Comparative Sound Levels

Common Outdoor Activity	dB(A)	Inside Activity
Jet Flyover at 1,000 ft. Gas Lawn Mower at 3 ft.	--110-- --100--	Rock Band
Diesel Truck at 50 ft. (at50 mph) Busy Urban Area Daytime	--90-- --80--	Food Blender at 3 ft. Garbage Disposal at 3 ft.
Gas Mower at 100 ft. Commercial Area Heavy Traffic at 300 ft.	--70-- --60--	Vacuum Cleaner at 10 ft. Normal Speech at 3 ft. Large Business Office
Quiet Urban Daytime Quiet Urban Nighttime Quiet Suburban Nighttime	--50-- --40--	Dishwasher Next Room Theater, Large Conference Room (Background)
Quiet Rural Nighttime	--30-- --20--	Library Bedroom at Night
Lowest Threshold of Human Hearing	--10-- --0--	Lowest Threshold of Human Hearing
Source: *California Dept. of Transportation Technical Noise Supplement, Oct. 1998, Pg. 18*		

2.4 Noise Abatement Measures

When traffic noise impacts are identified, noise abatement must be considered. The potential abatement alternatives include traffic management techniques, alternative roadway alignments, buffer zones, and noise barriers. The most common type of noise abatement measure is the construction of a noise barrier that reduces traffic noise by blocking the sound path between the roadway and the adjacent noise receptor.

Consistent with the FDOT PD&E Manual – Chapter 18, the following factors must be evaluated to determine if a noise barrier is considered feasible and reasonable:

- To be considered acoustically feasible, the barrier must reduce traffic-related noise levels by at least 5.0 dB(A) for at least two impacted receptors. Receptors that receive the 5.0 dB(A) reduction, or higher, are defined as "benefited" by FDOT. Consequently, noise barriers are not evaluated for isolated and single receptors.
- To be considered acoustically reasonable, the noise barrier must achieve the FDOT noise reduction design goal of 7.0 dB(A) for at least one benefited receptor.
- The cost per benefited receptor (CBPR) is calculated by multiplying the barrier's total square footage by $30. Per Chapter 18, $30 per/ft^2 is the statewide average used to determine cost reasonableness regardless of barrier type (shoulder/traffic railing mounted, right-of-way post/panel, etc.) To be considered cost reasonable, the total cost of a barrier that meets all acoustical criteria should not exceed the cost of $42,000 per benefited receptor.

In some locations, noise barriers may provide a benefit to non-impacted residences. Due to design considerations or aesthetics, CFX may propose noise barriers exceeding cost reasonableness limits. An example would be extending a noise barrier to maintain community continuity (i.e., avoiding terminating a noise barrier in the middle of a community).

Consistent with the FDOT Design Manual, Section 264[2], noise barrier heights are limited as follows:

- Noise barriers on bridge and retaining wall structures are limited to a maximum height of 8 feet; unless otherwise specified;
- Shoulder-mounted noise barriers at the edge of shoulder pavement are limited to a maximum height of 14 feet; and
- Non-shoulder mounted noise barriers (i.e., post and panel) located outside the clear recovery zone are limited to a maximum height of 22 feet. If a non-shoulder barrier is placed within the clear recovery zone, it must be shielded.

Other factors must also be considered when evaluating a barrier's feasibility, including accessibility, sight distance, and aesthetics. Accessibility refers to the ingress and egress to properties that would be affected by the construction of a noise barrier. Sight distance is a safety issue related to drivers' ability to see far enough in each direction to enter the roadway safely. Aesthetics refers to the noise barrier's physical appearance from both the highway and affected property sides.

[2] FDOT, *FDOT Design Manual*

3.0 TRAFFIC NOISE ANALYSIS

3.1 Identification of Noise Sensitive Sites

Using **Table 1** as a guide, the noise sensitive land uses analyzed within the study corridor fall under Activity Category B and C. The Category C land uses are associated with the Binion Reserve playground and the Ivy Trails pedestrian trail.

No land uses in the study corridor warrant an Activity Category A analysis. Analysis of interior (Activity Category D) noise levels was not required for this project as all Category C locations have areas of exterior use. A search of building permits for potentially noise sensitive Category G (undeveloped) and non noise sensitive Category F lands within the study area did not identify any active permits for future buildings that would be considered noise sensitive. Another search will be conducted during the final design process. Any noise sensitive land permitted between the time of this report and the approval of the Project Environmental Impact Report will be analyzed for project noise impacts if warranted.

3.2 Model Validation

Existing noise levels are measured in the project corridor to confirm if traffic is the primary noise source. These field measurements are also required to verify the accuracy of the TNM before it can be used to predict noise levels. A series of three 10-minute measurements were taken on September 16, 2022, using an Extech Instruments Model 407780 Type 2 Integrating Sound Level Meter. The sound level meter, calibrated at 114.0 dB(A) with an Extech Instruments Model 407766 calibrator, was adjusted to the A-weighted frequency scale, which approximates the frequency sensitivity of the human ear. Traffic data, including vehicle volumes, speeds by type, and meteorological conditions, were recorded during each measurement session. The data collection effort also recorded the travel speed for each type of vehicle using a Bushnell Speedster handheld radar gun.

One location within the study corridor was selected to undergo a series of three 10-minute measurements. The validation site, illustrated on page **D-2 in Appendix D**, was selected for measurement because it presented a clear view of free-flow traffic conditions on SR 429. No unusual noise events occurred during this location's three 10-minute monitoring sessions. The weather during the monitoring session was 77°, 97% humidity, under clear skies with a mild breeze ranging from 2 to 5 m.p.h.

Validation of TNM occurs when the model-predicted noise levels are within three decibels of the field-measured levels. Since all noise levels in this analysis are based on one hour, each of the 10-minute sessions field-recorded traffic volumes was adjusted upward by a factor of “6” to reflect hourly traffic flow. Once adjusted, these volumes were input into the noise prediction model. As shown in **Table 3**, TNM predicted within the 3.0-decibel acceptance range for each 10-minute session. Consequently, the model is acceptable for predicting noise levels for this project.

Table 3: Field Measurement Data and TNM Validation Results

FIELD TRAFFIC COUNT: 9/16/2022										
Session #1: 9:38 AM										
SR 429	**Cars**		**Medium Trucks**		**Heavy Trucks**		**Buses**		**Motorcycles**	
	Volume	**Avg. Speed**	**Volume**	**Avg. Speed**	**Volume**	**Avg. Speed**	**Volume**	**Avg. Speed**	**Volume**	**Avg. Speed**
SB	168	57	9	51	19	50	0	0	0	0
NB	147	54	15	51	19	50	0	0	0	0
Field Measurement (dB(A)):					68.6					
TNM Prediction (dB(A)):					69.9					
Variance:					1.3					
Session #2: 9:50 AM										
SR 429	**Cars**		**Medium Trucks**		**Heavy Trucks**		**Buses**		**Motorcycles**	
	Volume	**Avg. Speed**	**Volume**	**Avg. Speed**	**Volume**	**Avg. Speed**	**Volume**	**Avg. Speed**	**Volume**	**Avg. Speed**
SB	169	55	18	51	26	50	0	0	1	52
NB	144	53	11	51	20	50	0	0	0	0
Field Measurement (dB(A)):					68.0					
TNM Prediction (dB(A)):					69.9					
Variance:					1.9					
Session #3: 10:02 AM										
SR 429	**Cars**		**Medium Trucks**		**Heavy Trucks**		**Buses**		**Motorcycles**	
	Volume	**Avg. Speed**	**Volume**	**Avg. Speed**	**Volume**	**Avg. Speed**	**Volume**	**Avg. Speed**	**Volume**	**Avg. Speed**
SB	168	53	19	51	27	50	0	0	0	0
NB	113	53	14	51	22	50	0	0	1	53
Field Measurement (dB(A)):					69.1					
TNM Prediction (dB(A)):					70.2					
Variance:					1.1					

3.3 Predicted Noise Levels

Traffic on SR 429 is the dominant noise source within the project's evaluation area. For this project, 53 sites were analyzed for project-related impacts. The noise analysis divided the project corridor into three Noise Study Areas (NSA).

The 2022 existing condition and 2045 No-Build and Build Alternative noise analysis results discussed in this section are also presented in a noise impact comparison matrix in **Appendix C.** A summary of the results is provided in **Table 3**.

Four residential (Category B) receptors and one Category C Special Use site currently experience noise levels that meet or exceed the FDOT 66.0 dB(A) NAC. Predicted noise levels for the No-Build Alternative meet or exceed the NAC at nine Category B and one Category C receptor. By comparison, the Build Alternative is predicted to meet or exceed the NAC at 18 residential receptors and the same Category C site, with an average 3.1 dB(A) increase in noise over the existing condition. The greatest increase over existing is 4.9 dB(A); thus, none of the noise increases are considered substantial (defined as 15 dB(A) or higher).

When discussing noise level increases, the general rule that applies to perception is:

- A 3 dB(A) increase is barely perceptible to most people.
- A 5 dB(A) increase is noticeable to most people.
- A 10 dB(A) increase is perceived as twice as loud and considered a doubling noise.

A discussion of each NSA and the corresponding impact and abatement analysis is provided in the following sections. A set of project aerials illustrating the NSA's and analyzed sites is included in **Appendix D**.

Table 4: Impact Analysis Summary

Noise Sensitive Area	Activity Category	2022 Existing	2045 No-Build	2045 Build	Average Increase Over Existing
		# of receptors that meet or exceed NAC			
NSA 1 (undeveloped)	B	n/a	n/a	n/a	n/a
	C	n/a	n/a	n/a	
	Subtotal	n/a	n/a	n/a	
NSA 2	B	0	0	0	1.3 dB(A)
	C	0	0	0	
	Subtotal	0	0	0	
NSA 3 Binion Reserve	B	4	9	9	3.5 dB(A)
	C	0	0	0	
	Subtotal	4	9	9	
NSA 3 Ivy Trails	B	0	0	9	3.8 dB(A)
	C	1	1	1	
	Subtotal	1	1	10	
	Project Totals	***5***	***10***	***19***	***3.1 dB(A)***

3.3.1 Noise Study Area 1

NSA 1 comprises the area south of Boy Scout Road and east of Binion road. As of the date of this report, the site is undeveloped. A search was conducted to determine the plans for this area and whether or not active building permits are in place. The future development is referred to as The Ridge. Mass grading plans have been submitted to the St. Johns River Water Management District (SJRMWD). However, no active building/structure permits have been issued by the City of Apopka. Because there are currently no noise sensitive sites built or permitted, this area was not analyzed for noise impacts. This NSA is illustrated in **Appendix D: Page D-1**.

3.3.2 Noise Study Area 2

Across from NSA 1, north of Boy Scout Road, is NSA 2, which consists of scattered single-family residences. The residences, represented by receptors 2-1 through 2-10, are not part of a named subdivision.

Currently, the average noise level for these receptors is 55.8 dB(A), with the highest noise level being 59.8 dB(A) at receptor 2-10, which is located closest to the Binion Road / Boy Scout Road intersection. None of the sites currently meet or exceed their 66.0 dB(A) FDOT NAC, nor are they

predicted to do so under the No-Build alternative. Once the project is built, the overall traffic noise levels increase by an average of 1.3 dB(A), with the average project-related noise level predicted to be 57.1 dB(A). Receptor 2-2 has the highest build-related noise level, 63.7 dB(A), which is a 3.3 dB(A) increase over the existing condition. None of the increases over existing are considered substantial, and none of the sites are predicted to exceed the NAC. Abatement evaluation for this NSA is not required.

3.3.3 Noise Study Area 3

NSA 3 comprises the area east of SR 429 from the project beginning limits (Binion Road) to the project ending limits (Lust Road). Within this NSA, two residential developments are in various stages of construction – Binion Reserve and Ivy Trails. The two developments and their associated noise sensitive sites are illustrated in **Appendix D: Page D-2**.

Binion Reserve

Binion Reserve is a new residential development located in the northeast quadrant of the proposed SR 429 / Binion Road interchange. The residences within the development are under various stages of construction, with many homes nearest to Binion Road being completely constructed or very near completion. Numerous sites immediately adjacent to SR 429 are under active construction. The majority of the sites are at a higher elevation than SR 429 with the sites located at the southern end having the greatest elevation differences. All home sites fronting SR 429, the future ramps, and the Binion Road / Boy Scout Road intersection were included in the analysis.

The homes are represented by receptors 3-1 through 3-25. The single Category C site, the neighborhood playground, is represented by receptor SLU1. The development's six-foot-tall privacy wall was included in the analysis.

Currently, the average noise level for the Binion Reserve sites is 60.7 dB(A), with the highest noise level being 70.5 dB(A) at receptor 3-16. Currently, sites 3-11 and 3-15 through 3-17 are affected by traffic noise. Under the No-Build alternative, nine sites represented by receptors 3-10 through 3-18 are predicted to meet or exceed the FDOT NAC. Once the project is built, the overall traffic noise levels increase by an average of 3.5 dB(A), with the average project-related noise level predicted to be 64.2 dB(A). Receptor 3-16 has the highest predicted build noise level (74.0 dB(A)). None of the increases over existing are considered substantial.

Because the predicted noise levels meet or exceed the 66.0 dB(A) FDOT NAC, they are considered impacted. Noise abatement was considered to mitigate these impacts, as summarized in **Section 3.2.4.1.**

Ivy Trails

Ivy Trails is a new residential development located north of Binion Reserve. Site development is nearing completion, with building/structure construction imminent. The home sites are represented by receptors 3-26 through 3-42. The single Category C site, the neighborhood pedestrian walking trail, is represented by receptor SLU2. All home sites fronting SR 429 were included in the analysis.

Currently, the average noise level for the Ivy Trails home sites and the trail is 61.3 dB(A). The highest noise level (66.0 dB(A)) occurs at receptor SLU2. The trail is the only site currently affected by traffic noise and is also the only site predicted to meet or exceed the FDOT NAC under the No-Build alternative. The average noise level predicted for the No-Build is 64.4 dB(A). Once the project is built, the overall traffic noise levels increase by an average of 3.8 dB(A), with the average project-related noise level predicted to be 65.0 dB(A). The highest noise level within Ivy Trails continues to be attributed to the trail (67.8 dBA), while the highest noise level for the homes sites is 66.4 dB(A) at receptors 3-30 and 3-31. None of the increases over existing are considered substantial, and none of the sites are predicted to exceed the NAC.

Because the predicted noise levels meet or exceed the 66.0 dB(A) FDOT NAC, they are considered impacted. Noise abatement was considered to mitigate these impacts, as summarized in **Section 3.2.4.1.**

3.2.4.1 Noise Barrier NB1

Three scenarios were evaluated to determine potential abatement options for the 18 impacted home sites and the pedestrian trail in NSA 3. The following options were analyzed to provide noise reduction to the sites within Binion Reserve and Ivy Trails from an acoustic and cost perspective. The analyzed options are summarized in **Table 5** and illustrated in **Appendix E**.

- Option 1 – This option was evaluated as a single noise barrier.
    - This option includes a maximum height barrier (14 feet tall) located at the edge of the northbound entry ramp and mainline shoulder edge of pavement. The approximate stationing is 1571+00 to 600+00.
    - This 2,903-foot-long barrier can benefit 24 residences (16 impacted and eight non-impacted) and the trail.
    - This option provides an average noise reduction of 7.0 dB(A) and a maximum reduction of 11.9 dB(A).
    - However, with an estimated cost of $1,219,260, the Cost Per Benefited Receptor (CPBR) is $50,803, which is over the FDOT cost-reasonableness guideline of $42,000 per benefited receptor.

- Option 2 – This option was evaluated as a single noise barrier.
    - This option includes a maximum height barrier in the same location as Option 1 but with a reduced length. The approximate stationing is 1576+20 to 600+00.
    - This 2,385-foot-long barrier can benefit 24 residences (16 impacted and eight non-impacted) and the trail.
    - This option provides an average noise reduction of 7.0 dB(A) and a maximum reduction of 11.9 dB(A).
    - The estimated cost for this option is $1,001,700, and it has a $41,738 CPBR, which is within FDOT cost-reasonableness guidelines.

- Option 3 – This option was evaluated as a two-segment noise barrier system.
    - This option was evaluated to further reduce the length of the maximum height shoulder barrier but add in a second segment located approximately 10 feet from the CFX right-of-way (ROW) line.
        - Segment 1: 14-foot-tall tall shoulder barrier with a total length of 2,005 feet; approximate stationing is 1580+00 to 600+00.
        - Segment 2: ROW barrier with a total length of 604 feet; stepped to account for the change in topography from south to north
            - Step 1 – 10’ tall – sta. 1575+00 to 1576+00
            - Step 2 – 12’ tall – sta. 1576+00 to 1577+00
            - Step 3 – 14’ tall – sta. 1577+00 to 1579+00
            - Step 4 – 16’ tall – sta. 1579+00 to 1581+00
    - This barrier system can benefit 26 residences (all 18 impacted and eight non-impacted) and the trail.
    - This option provides an average noise reduction of 7.1 dB(A) and a maximum reduction of 12.1 dB(A).
    - The estimated cost for this option is $1,089,720, with a $41,912 CPBR, which is within FDOT cost-reasonableness guidelines.

Barrier NB1 Option 2 and Option 3 meet all FDOT acoustic and cost-reasonableness criteria and are recommended for further consideration during the final design process.

Table 5: Noise Barrier NB1 Evaluation Summary

NSA 3: Barrier NB1 Evaluation Summary															
Evaluated Barrier Options					Number of Impacted Residential Sites	Number of Impacted Sites Within a Noise Reduction Range			Number of Benefited Sites *1				Total Estimated Cost *4	Cost per Benefited Receptor *5	Recommended for further consideration in final design?
Option	Barrier Type/Location	Height (feet) *6	Length (feet)	Approx. Station		5-5.9 dB(A)	6-6.9 dB(A)	≥ 7.0 dB(A) *2	Impacted	Other *3	Total	Avg / Max Reduction dB(A)			
Option 1	**Shoulder**	14	2,903	1571 to 600	18	4	7	5	16	8	24	7.0 / 11.9	$ 1,219,260	$ 50,803	No
Option 2	**Shoulder**	14	2,385	1576+20 to 600		4	7	5	16	8	24	7.0 / 11.9	$ 1,001,700	$ 41,738	Yes
Option 3 *two-segment system (stepped)*	**Shoulder**	14	2,005	1580 to 600		3	8	7	18	8	26	7.1 / 12.1	$ 1,089,720	$ 41,912	Yes
	ROW - step 1	10	100	1575 to 1576											
	ROW - step 2	12	101	1576 to 1577											
	ROW -step 3	14	203	1577 to 1579											
	ROW - step 4	16	200	1579 to 1581											

*1 = Minimum of 5.0 dB(A) required to be considered benefited by noise barrier.
*2 = FDOT Noise Reduction Design Goal is 7.0 dB(A) at a minimum of 1 benefited receptor.
*3 = Refers to non-impacted noise-sensitive sites.
*4 = Based on FDOT Statewide average of $30 per square foot.
*5 = FDOT Reasonable Cost Guideline is $42,000.
*6 = 8-ft max on MSE/Bridge; 14-ft max on shoulder; 22-ft max at ROW or offset from shoulder.

4.0 CONCLUSION

Five sites (4 Category B and one Category C) are currently affected by traffic noise. The noise levels associated with the 2045 No-Build Alternative are predicted to meet or exceed the 66.0 dB(A) FDOT NAC at nine Category B residences and one Category C site.

Once the widening project is built, the overall traffic noise levels will increase by an average of 3.1 dB(A), with the average project-related noise level, predicted to be 63.2 dB(A). The 2050 Build Alternative's noise levels are predicted to meet or exceed the 66.0 dB(A) FDOT NAC at 18 Category B and one Category C receptor. The highest noise level is predicted to be 74.0 dB(A) in NSA 3. None of the increases are considered substantial (i.e., 15 dB(A) or more over existing levels).

As required, noise abatement consideration was given to all 19 impacted sites. Noise Barrier NB1 was evaluated to mitigate the impacts. Of the three analyzed options, Option 2 and Option 3 were found to meet all FDOT acoustic and cost criteria. Thus, the two options, summarized in **Table 6,** are recommended for further consideration in the project's final design phase.

Table 6: Project #429-309 Noise Barrier Recommendations

Noise Study Area	Impacted Development	Barrier ID	Barrier Height (ft)*2	Barrier Length (ft)	Barrier Location	Estimated Barrier Cost *1	Recommended for Further Evaluation?
NSA 3	Binion Reseve Ivy Trails	NB1 Option 2	14	2,385	Shoulder	$1,001,700	Yes
		NB1 Option3	14	2,005	Shoulder	$1,089,720	Yes
			10/12/14/16	604	ROW		

**1 = Based on FDOT Statewide average of $30 per square foot.*

**2 = 8-ft max on MSE/Bridge; 14-ft max on shoulder; 22-ft max at ROW or offset from shoulder.*

4.1 Statement of Likelihood

The Central Florida Expressway Authority is committed to the construction of feasible and reasonable noise abatement measures identified in **Table 6,** contingent upon the following conditions:

- Final recommendations on the construction of abatement measures are determined during the project's final design and through the public involvement process.
- Detailed noise analyses during the final design process support the need, feasibility, and reasonableness of providing abatement.
- Cost analysis indicates that the cost of the noise barrier(s) will not exceed the cost reasonable criterion.
- Community input supporting types, heights, and locations of the noise barrier(s) is provided to CFX.
- Safety and engineering aspects as related to the roadway user and the adjacent property owner have been reviewed, and any conflicts or issues resolved.

5.0 CONSTRUCTION NOISE AND VIBRATION IMPACTS

Construction of the proposed roadway improvements is not expected to have significant vibration or construction noise impacts. Applying the FDOT Standard Specifications for Road and Bridge Construction is anticipated to minimize or eliminate most of the potential short-term noise and vibration impacts.

Should any construction noise or vibration issues arise during construction, the Project Engineer, in concert with the CFX Noise Specialist and the Contractor, will investigate additional methods of controlling these impacts.

6.0 COMMUNITY COORDINATION

6.1 Noise Impact Contours

To aid in promoting land use compatibility, a copy of this report, which provides information that can be used to protect future land development from becoming incompatible with anticipated traffic noise levels, will be made available for use by Orange County and City of Apopka officials. In addition, generalized noise impact contours for the Build Alternative have been developed, identifying the distances between the Build Alternative and the location where traffic noise levels approach the NAC for Activity Categories A, B, C, and E. The contour distances provided in **Table 7** do not account for any reduction in noise levels that may be provided by berms, privacy walls, or intervening structures. These distances also do not account for any increase in noise levels caused by a variation in the noise path, increased roadway elevation, or increased elevation of a

noise sensitive site (e.g., second-floor patio). To minimize the potential for incompatible land use, future noise sensitive land uses should be located beyond these distances.

Table 7: Critical Distance Impact Contours

Impact Contours				
Activity Category *1	Corresponding Noise Abatement Criterion	Distance to EOP*2		
		SR 429	Binion Road	Boy Scout Road
Category A	56 dB(A)	585 ft	145 ft	145 ft
Category B and C	66 dB(A)	235 ft	45 ft	45 ft
Category E	71 dB(A)	140 ft	10 ft	10 ft

*1 Activity Categories as defined in 23 CFR 772.
*2 Distance to the nearest edge of pavement.

6.2 Public Meetings

A public meeting will be held for this project. Any comments received during the public meeting comment period about the PD&E Study in general, as well as those pertinent to the noise analysis, will be documented under separate cover.

During the final design process, CFX will hold a Sound Wall Information Meeting (SWIM) in which the proposed noise barrier(s) and other pertinent project construction-related information will be presented to the public. To aid in the decision-making process, CFX will directly solicit the opinions of the property owners and renters found to benefit (e.g., receive a minimum 5 dB(A) reduction in noise) from the proposed noise barrier. The solicitation of viewpoints will be conducted as part of the SWIM and mailed survey. The CFX SWIM process and survey results for this project will be documented under separate cover.

7.0 REFERENCES

FHWA. *Code of Federal Regulations*, Title 23 Part 772, "Procedures for Abatement of Highway Traffic Noise and Construction Noise." July 13, 2010.

FHWA. *Highway Traffic Noise: Analysis and Abatement Guidance, FHWA-HEP-10-025.* December 2011.

FHWA. *Recommended Best Practices for the Use of the FHWA Traffic Noise Model (TNM*. December 8, 2015.

FDOT. A+ Plus Aerial Photo Look-Up System. 2022.

FDOT. *FDOT Design Manual*

FDOT. *Project Development and Environment Manual:* Part II, Chapter 18. Effective July 1, 2020.

FDOT. *Standard Specifications for Road and Bridge Construction*.

FDOT. *Traffic Noise Modeling and Analysis Practitioners Handbook*. December 2018.

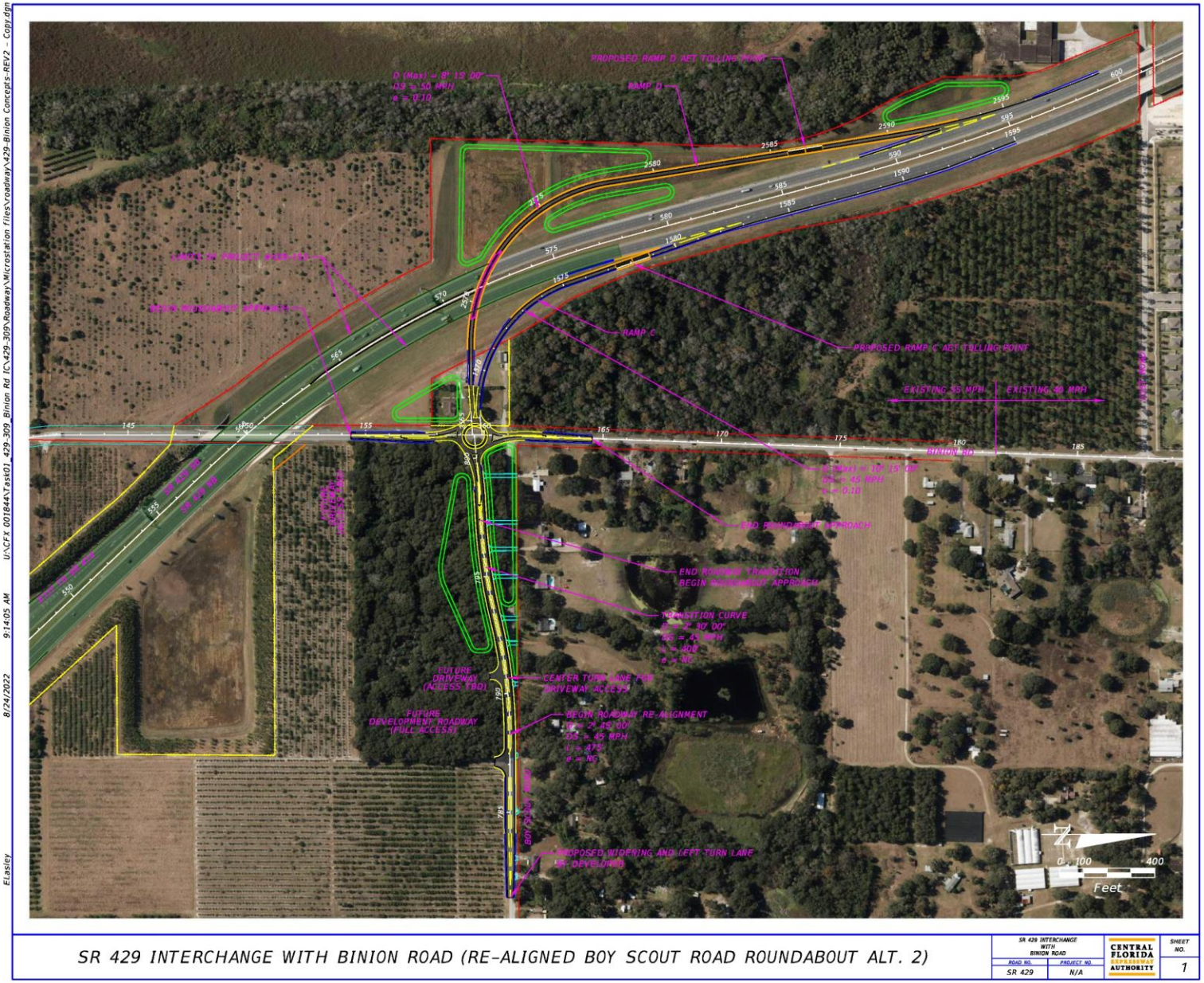
Google Earth, @2022 Google. Imagery and elevation data.

Section 335.17, *Florida Statutes. State Highway Construction; Means of Noise Abatement.* 2012.

USGS. National Map 2022; https://apps.nationalmap.gov/lidar-explorer/#/.

Appendix A:

Preferred Build Alternative Project Layout


PROPOSED RAMP D AET TOLLING POINT
RAMP D
RAMP C
PROPOSED RAMP C AET TOLLING POINT
EXISTING 55 MPH
EXISTING 40 MPH
END ROUNDABOUT APPROACH
END ROADWAY TRANSITION
BEGIN ROUNDABOUT APPROACH
TRANSITION CURVE
FUTURE DRIVEWAY (ACCESS TBD)
CENTER TURN LANE FOR DRIVEWAY ACCESS
FUTURE DEVELOPMENT ROADWAY (FULL ACCESS)
BEGIN ROADWAY RE-ALIGNMENT
PROPOSED WIDENING AND LEFT TURN LANE
BOY SCOUT RAMP
0 100 400
Feet
SR 429 INTERCHANGE WITH BINION ROAD (RE-ALIGNED BOY SCOUT ROAD ROUNDABOUT ALT. 2)
SR 429 INTERCHANGE WITH BINION ROAD
ROAD NO. SR 429
PROJECT NO. N/A
CENTRAL FLORIDA EXPRESSWAY AUTHORITY
SHEET NO. 1

Appendix B:

Noise Study Traffic Data

Noise Analysis Traffic Data - SR 429 and Binion Road Interchange
2022 Existing Conditions

Freeway Mainline													
Mainline Segment	Number of Lanes	Two-Way AADT	Two-Way LOS C AADT	Peak Hour Peak Direction	LOS C Peak Hour Peak Direction	Design Hr. % T	Design Hr. % MT	Design Hr. % HT	Design Hr. % Buses	Design Hr. % Motorcycles	Standard K-factor	D-factor	Posted Speed (mph)
SR 429													
North of US 441 (Ponkan Mainline Plaza)	4	46,300	59,400	2,121	3,100	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	70
From US 441 to SR 414	6	53,300	89,000	2,449	4,650	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	70
South of SR 414	6	60,000	78,500	2,799	4,100	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	70
SR 429 Ramps													
SR 429 Ramp	Number of Lanes	One-Way AADT	One-Way LOS C AADT	Peak Hour Peak Direction	LOS C Peak Hour Peak Direction	Design Hr. % T	Design Hr. % MT	Design Hr. % HT	Design Hr. % Buses	Design Hr. % Motorcycles	K-factor	D-factor	Operational Speed (mph)
US 441													
Southbound off	1	500	14,600	46	1,350	2.00%	0.41%	1.55%	0.04%	0.01%	8.7%	52.8%	45
Northbound on	1	500	14,600	46	1,350	2.00%	0.41%	1.55%	0.04%	0.01%	8.7%	52.8%	45
Southbound on	2	4,000	29,400	369	2,700	2.00%	0.41%	1.55%	0.04%	0.01%	8.7%	52.8%	45
Northbound off	2	4,000	29,400	369	2,700	2.00%	0.41%	1.55%	0.04%	0.01%	8.7%	52.8%	45
SR 414													
Southbound off	2	9,650	25,800	1,008	2,700	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	45
Northbound on	2	9,650	25,800	1,008	2,700	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	45
Southbound on	2	13,000	25,900	1,359	2,700	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	45
Northbound off	2	13,000	25,900	1,359	2,700	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	45
Arterials and Cross Streets													
Arterial Segment	Number of Lanes	Two-Way AADT	Two-Way LOS C AADT	Peak Hour Peak Direction	LOS C Peak Hour Peak Direction	Design Hr. % T	Design Hr. % MT	Design Hr. % HT	Design Hr. % Buses	Design Hr. % Motorcycles	K-factor	D-factor	Posted Speed (mph)
Binion Road													
North of Boy Scout Road	2	7,100	16,600	378	820	4.00%	2.40%	1.47%	0.13%	0.21%	9.0%	54.9%	40
South of Boy Scout Road	2	5,200	16,200	261	820	4.00%	2.40%	1.47%	0.13%	0.21%	9.0%	56.1%	40
Boy Scout Road													
East of Binion Road	2	4,700	15,700	220	740	4.00%	2.40%	1.47%	0.13%	0.21%	9.0%	52.2%	45

AADT: Annual Average Daily Traffic *MT: Medium Trucks* *HT: Heavy Trucks*

(1) Number of lanes are obtained from field observations and aerial maps.
(2) Traffic data are obtained from the PD&E study traffic development effort.
(3) Peak hour demand and LOS C peak hour maximum service volumes are provided directionally.
(4) LOS C targets are based on the FDOT 2020 Quality/Level of Service Handbook tables, and adjusted for local conditions.
(5) LOS C AADTs are estimated using K and D factors and the design hour peak direction LOS C maximum service volumes.
(6) The vehicle classification factors are obtained from Florida Traffic Online.
(7) Posted speed data are obtained by field observations.

Noise Analysis Traffic Data - SR 429 and Binion Road Interchange
2045 No Build Conditions

Freeway Mainline													
Mainline Segment	**Number of Lanes**	**Two-Way AADT**	**Two-Way LOS C AADT**	**Peak Hour Peak Direction**	**LOS C Peak Hour Peak Direction**	**Design Hr. % T**	**Design Hr. % MT**	**Design Hr. % HT**	**Design Hr. % Buses**	**Design Hr. % Motorcycles**	**Standard K-factor**	**D-factor**	**Posted Speed (mph)**
SR 429													
North of US 441 (Ponkan Mainline Plaza)	4	108,200	59,400	5,610	3,100	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	70
From US 441 to SR 414	6	118,700	89,000	6,140	4,650	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	70
South of SR 414	8	115,700	118,700	5,980	6,200	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	70
SR 429 Ramps													
SR 429 Ramp	**Number of Lanes**	**One-Way AADT**	**One-Way LOS C AADT**	**Peak Hour Peak Direction**	**LOS C Peak Hour Peak Direction**	**Design Hr. % T**	**Design Hr. % MT**	**Design Hr. % HT**	**Design Hr. % Buses**	**Design Hr. % Motorcycles**	**K-factor**	**D-factor**	**Operational Speed (mph)**
US 441													
Southbound off	1	5,100	14,600	470	1,350	2.00%	0.41%	1.55%	0.04%	0.01%	8.7%	52.8%	45
Northbound on	1	5,100	14,600	470	1,350	2.00%	0.41%	1.55%	0.04%	0.01%	8.7%	52.8%	45
Southbound on	2	10,350	29,400	950	2,700	2.00%	0.41%	1.55%	0.04%	0.01%	8.7%	52.8%	45
Northbound off	2	10,350	29,400	950	2,700	2.00%	0.41%	1.55%	0.04%	0.01%	8.7%	52.8%	45
SR 414													
Southbound off	2	24,100	25,800	2,520	2,700	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	45
Northbound on	2	24,100	25,800	2,520	2,700	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	45
Southbound on	2	22,600	25,900	2,360	2,700	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	45
Northbound off	2	22,600	25,900	2,360	2,700	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	45
Arterials and Cross Streets													
Arterial Segment	**Number of Lanes**	**Two-Way AADT**	**Two-Way LOS C AADT**	**Peak Hour Peak Direction**	**LOS C Peak Hour Peak Direction**	**Design Hr. % T**	**Design Hr. % MT**	**Design Hr. % HT**	**Design Hr. % Buses**	**Design Hr. % Motorcycles**	**K-factor**	**D-factor**	**Posted Speed (mph)**
Binion Road													
North of Boy Scout Road	2	15,000	16,600	740	820	4.00%	2.40%	1.47%	0.13%	0.21%	9.0%	54.9%	40
South of Boy Scout Road	2	12,100	16,200	610	820	4.00%	2.40%	1.47%	0.13%	0.21%	9.0%	56.1%	40
Boy Scout Road													
East of Binion Road	2	10,000	15,700	470	740	4.00%	2.40%	1.47%	0.13%	0.21%	9.0%	52.2%	45

AADT: Annual Average Daily Traffic *MT: Medium Trucks* *HT: Heavy Trucks*

(1) Number of lanes are obtained from field observations, aerial maps and planned projects information.
(2) Traffic data are obtained from the PD&E study traffic development effort.
(3) Peak hour demand and LOS C peak hour maximum service volumes are provided directionally.
(4) LOS C targets are based on the FDOT 2020 Quality/Level of Service Handbook tables, and adjusted for local conditions.
(5) LOS C AADTs are estimated using K and D factors and the design hour peak direction LOS C maximum service volumes.
(6) The vehicle classification factors are obtained from Florida Traffic Online.
(7) Posted speed data are obtained by field observations.

Noise Analysis Traffic Data - SR 429 and Binion Road Interchange
2045 Build Conditions

Freeway Mainline													
Mainline Segment	Number of Lanes	Two-Way AADT	Two-Way LOS C AADT	Peak Hour Peak Direction	LOS C Peak Hour Peak Direction	Design Hr. % T	Design Hr. % MT	Design Hr. % HT	Design Hr. % Buses	Design Hr. % Motorcycles	Standard K-factor	D-factor	Posted Speed (mph)
SR 429													
North of US 441 (Ponkan Mainline Plaza)	4	108,400	59,400	5,630	3,100	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	70
From US 441 to Binion Road	6	120,900	89,000	6,240	4,650	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	70
From Binion Road to SR 414	8	116,300	118,700	6,030	6,200	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	70
South of SR 414	8	113,800	118,700	5,900	6,200	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	70
SR 429 Ramps													
SR 429 Ramp	Number of Lanes	One-Way AADT	One-Way LOS C AADT	Peak Hour Peak Direction	LOS C Peak Hour Peak Direction	Design Hr. % T	Design Hr. % MT	Design Hr. % HT	Design Hr. % Buses	Design Hr. % Motorcycles	K-factor	D-factor	Operational Speed (mph)
US 441													
Southbound off	1	4,100	14,600	380	1,350	2.00%	0.41%	1.55%	0.04%	0.01%	8.7%	52.8%	45
Northbound on	1	4,100	14,600	380	1,350	2.00%	0.41%	1.55%	0.04%	0.01%	8.7%	52.8%	45
Southbound on	2	10,350	29,400	950	2,700	2.00%	0.41%	1.55%	0.04%	0.01%	8.7%	52.8%	45
Northbound off	2	10,350	29,400	950	2,700	2.00%	0.41%	1.55%	0.04%	0.01%	8.7%	52.8%	45
Binion Road													
Southbound off	1	2,300	13,400	230	1,350	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	53.0%	45
Northbound on	1	2,300	13,400	230	1,350	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	53.0%	45
SR 414													
Southbound off	2	23,850	25,800	2,490	2,700	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	45
Northbound on	2	23,850	25,800	2,490	2,700	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	45
Southbound on	2	22,600	25,900	2,360	2,700	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	45
Northbound off	2	22,600	25,900	2,360	2,700	2.00%	0.41%	1.55%	0.04%	0.01%	9.5%	55.0%	45
Arterials and Cross Streets													
Arterial Segment	Number of Lanes	Two-Way AADT	Two-Way LOS C AADT	Peak Hour Peak Direction	LOS C Peak Hour Peak Direction	Design Hr. % T	Design Hr. % MT	Design Hr. % HT	Design Hr. % Buses	Design Hr. % Motorcycles	K-factor	D-factor	Posted Speed (mph)
Binion Road													
North of Boy Scout Road	2	13,800	16,600	680	820	4.00%	2.40%	1.47%	0.13%	0.21%	9.0%	54.9%	40
South of Boy Scout Road	2	12,300	16,200	620	820	4.00%	2.40%	1.47%	0.13%	0.21%	9.0%	56.1%	40
Boy Scout Road													
East of Binion Road	2	10,600	15,700	500	740	4.00%	2.40%	1.47%	0.13%	0.21%	9.0%	52.2%	45

AADT: Annual Average Daily Traffic *MT: Medium Trucks* *HT: Heavy Trucks*

(1) Number of lanes are obtained from field observations, aerial maps and planned projects information.
(2) Traffic data are obtained from the PD&E study traffic development effort.
(3) Peak hour demand and LOS C peak hour maximum service volumes are provided directionally.
(4) LOS C targets are based on the FDOT 2020 Quality/Level of Service Handbook tables, and adjusted for local conditions.
(5) LOS C AADTs are estimated using K and D factors and the design hour peak direction LOS C maximum service volumes.
(6) The vehicle classification factors are obtained from Florida Traffic Online.
(7) Posted speed data are obtained by field observations.

Appendix C:

Noise Impact Comparison Matrix

Noise Impact Comparison Matrix

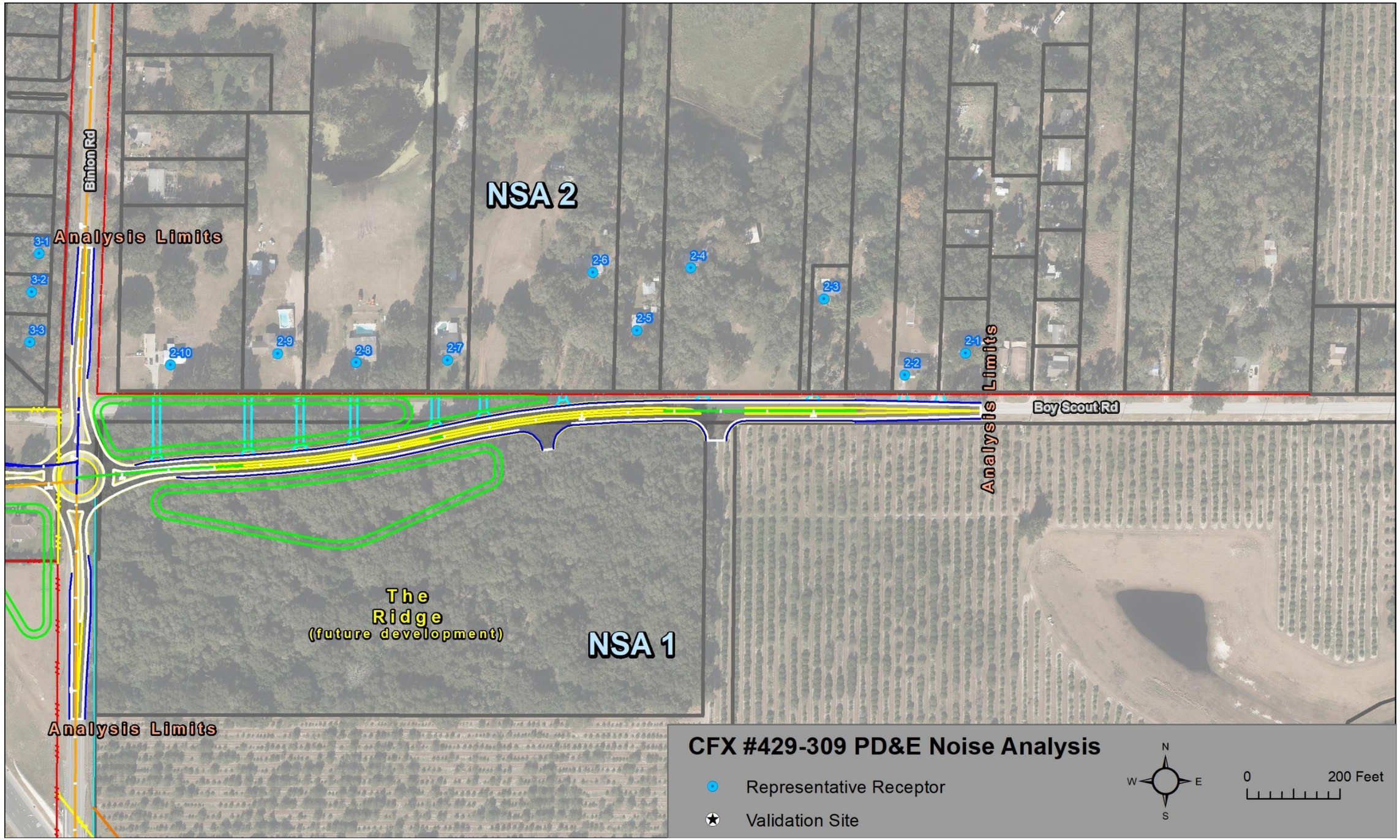
Noise Sensitive Sites			Predicted Noise Levels (dB(A)) *Red = Noise Level above NAC*				
Receptor ID	**# Sites Represented**	**NAC Impact Criterion (dB(A))**	**2022 Existing**	**2045 No-Build Alternative**	**2045 Build Alternative**	**Build Change From Existing**	***Consider Abatement***
NSA 1: South of Boy Scout Road from Binion Road to project end - Illustrated on Page D-1 - Appendix D							
No noise sensitive sites							
NSA 2: North of Boy Scout Road from Binion Road to project end - Illustrated on Page D-1 - Appendix D							
Scattered single-family homes							
2-1	1	66.0	56.7	60.0	60.6	3.9	-
2-2	1	66.0	60.4	63.7	63.7	3.3	-
2-3	1	66.0	51.7	55.0	55.8	4.1	-
2-4	1	66.0	51.5	54.8	53.5	2.0	-
2-5	1	66.0	54.2	57.6	57.2	3.0	-
2-6	1	66.0	51.5	54.7	53.7	2.2	-
2-7	1	66.0	57.8	61.2	57.5	-0.3	-
2-8	1	66.0	57.9	61.3	56.0	-1.9	-
2-9	1	66.0	56.2	59.5	55.2	-1.0	-
2-10	1	66.0	59.8	63.1	57.5	-2.3	-
NSA Summary	***10***		***55.8***	***59.1***	***57.1***	***1.3***	***0***
NSA 3: Binion Road Interchange to Lust Road (east of SR 429) - Illustrated on Page D-2 - Appendix D							
Binion Reserve							
3-1	1	66.0	60.0	63.0	62.4	2.4	-
3-2	1	66.0	58.1	61.1	60.3	2.2	-
3-3	1	66.0	55.8	58.8	58.0	2.2	-
3-4	1	66.0	53.6	56.7	55.9	2.3	-
3-5	1	66.0	54.4	57.7	57.2	2.8	-
3-6	1	66.0	57.7	60.9	61.1	3.4	-
3-7	1	66.0	59.2	62.4	62.6	3.4	-
3-8	1	66.0	60.3	63.5	63.9	3.6	-
3-9	1	66.0	62.0	65.2	65.7	3.7	-
3-10	1	66.0	62.9	***66.1***	***66.7***	3.8	**Yes**
3-11	1	66.0	***66.3***	***69.4***	***70.0***	3.7	**Yes**
3-12	1	66.0	64.8	***67.9***	***68.6***	3.8	**Yes**
3-13	1	66.0	64.5	***67.5***	***68.0***	3.5	**Yes**
3-14	1	66.0	64.1	***67.1***	***67.5***	3.4	**Yes**
3-15	1	66.0	***68.8***	***71.8***	***72.3***	3.5	**Yes**
3-16	1	66.0	***70.5***	***73.5***	***74.0***	3.5	**Yes**

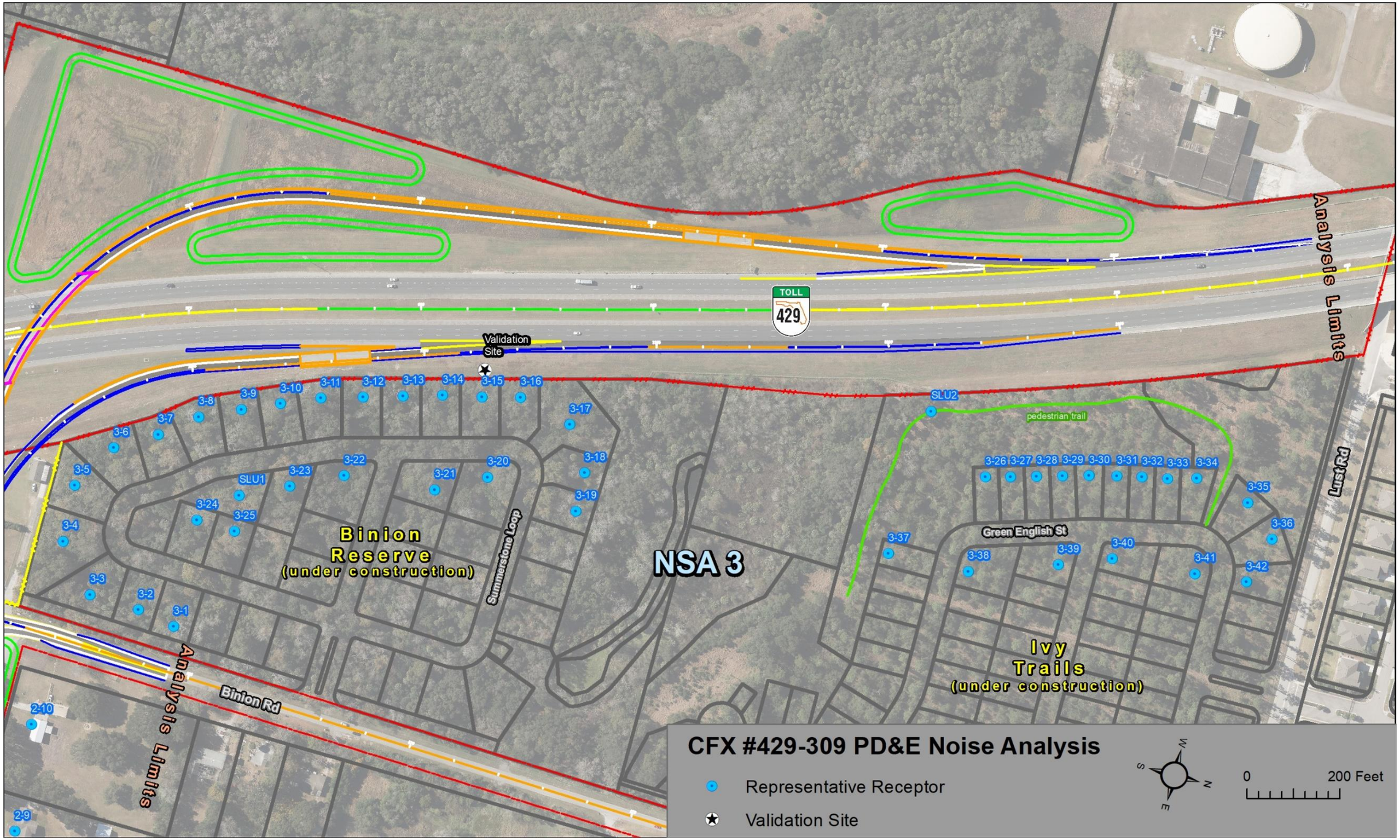
Noise Impact Comparison Matrix

Noise Sensitive Sites			Predicted Noise Levels (dB(A)) *Red = Noise Level above NAC*				
Receptor ID	**# Sites Represented**	**NAC Impact Criterion (dB(A))**	**2022 Existing**	**2045 No-Build Alternative**	**2045 Build Alternative**	**Build Change From Existing**	***Consider Abatement***
3-17	1	66.0	***67.3***	***70.3***	***71.4***	4.1	***Yes***
3-18	1	66.0	63.5	***66.7***	***68.4***	4.9	***Yes***
3-19	1	66.0	60.0	63.1	64.3	4.3	-
3-20	1	66.0	60.4	63.5	64.5	4.1	-
3-21	1	66.0	59.1	62.2	62.9	3.8	-
3-22	1	66.0	57.9	61.0	61.7	3.8	-
3-23	1	66.0	57.9	61.1	61.9	4.0	-
3-24	1	66.0	55.9	59.1	59.8	3.9	-
3-25	1	66.0	55.8	59.0	59.7	3.9	-
SLU1	1	66.0	56.1	59.3	60.0	3.9	-
Ivy Trails							
3-26	1	66.0	62.1	65.1	***66.0***	3.9	***Yes***
3-27	1	66.0	62.1	65.1	***66.0***	3.9	***Yes***
3-28	1	66.0	62.2	65.3	***66.0***	3.8	***Yes***
3-29	1	66.0	62.4	65.5	***66.2***	3.8	***Yes***
3-30	1	66.0	62.5	65.6	***66.4***	3.9	***Yes***
3-31	1	66.0	62.4	65.5	***66.4***	4.0	***Yes***
3-32	1	66.0	62.2	65.3	***66.3***	4.1	***Yes***
3-33	1	66.0	61.9	65.0	***66.3***	4.4	***Yes***
3-34	1	66.0	62.0	65.1	***66.2***	4.2	***Yes***
3-35	1	66.0	61.7	64.9	65.3	3.6	-
3-36	1	66.0	60.5	63.7	64.4	3.9	-
3-37	1	66.0	58.8	62.0	62.7	3.9	-
3-38	1	66.0	58.7	62.0	62.4	3.7	-
3-39	1	66.0	59.0	62.3	62.8	3.8	-
3-40	1	66.0	59.7	62.9	63.3	3.6	-
3-41	1	66.0	59.3	62.6	63.2	3.9	-
3-42	1	66.0	59.1	62.4	63.1	4.0	-
Ivy Trails - Pedestrian Trail							
SLU2	1	66.0	***66.0***	***69.0***	***67.8***	1.8	***Yes***
NSA Summary	***43***		***60.9***	***64.0***	***64.5***	***3.6***	***19***

Appendix D:

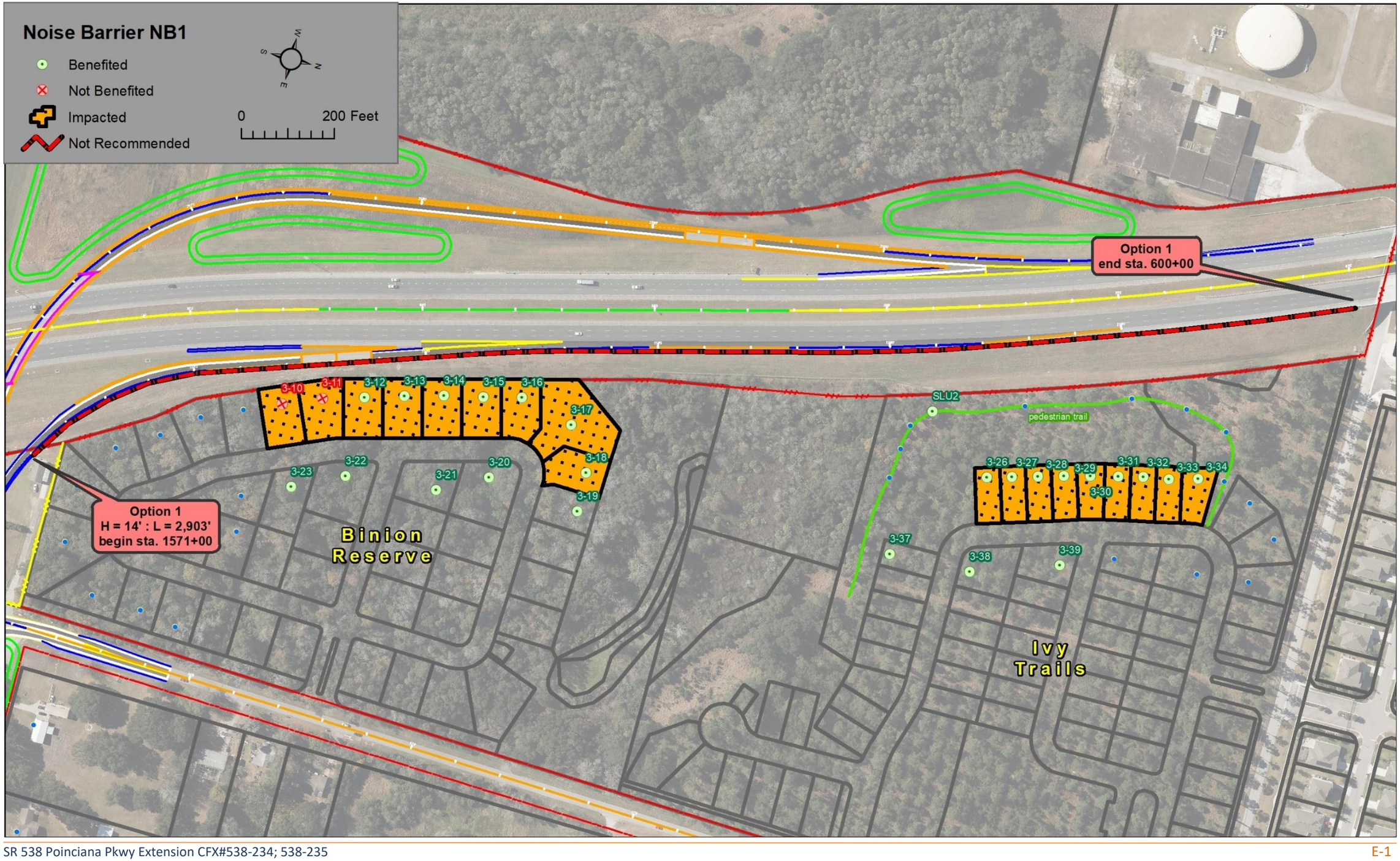
Project Aerials

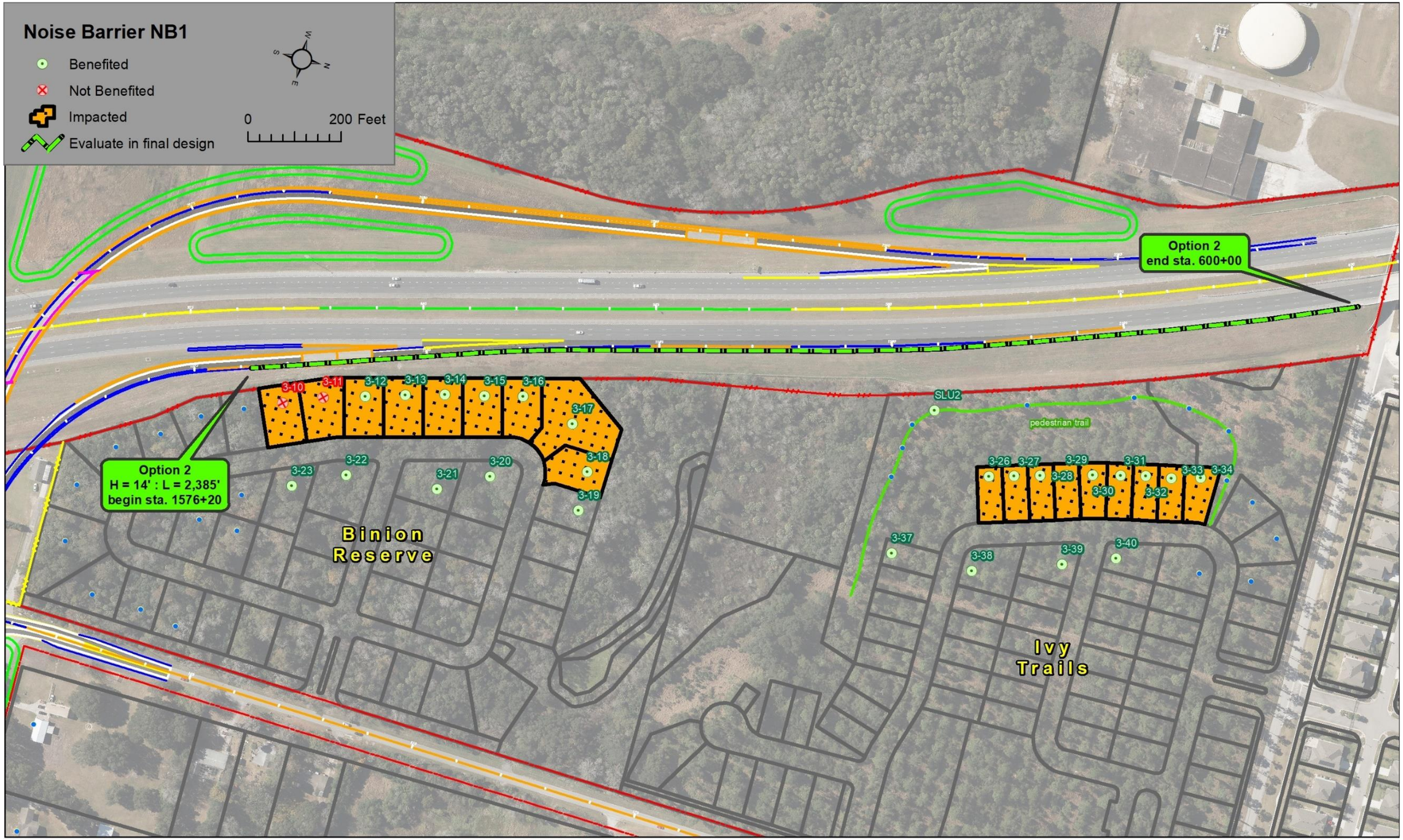

Binion Rd
NSA 2
Analysis Limits
3-1
3-2
3-3
2-10
2-9
2-8
2-7
2-6
2-5
2-4
2-3
2-2
2-1
Analysis Limits
Boy Scout Rd
The
Ridge
(future development)
NSA 1
Analysis Limits
CFX #429-309 PD&E Noise Analysis
Representative Receptor
Validation Site
N
W
E
S
0
200 Feet

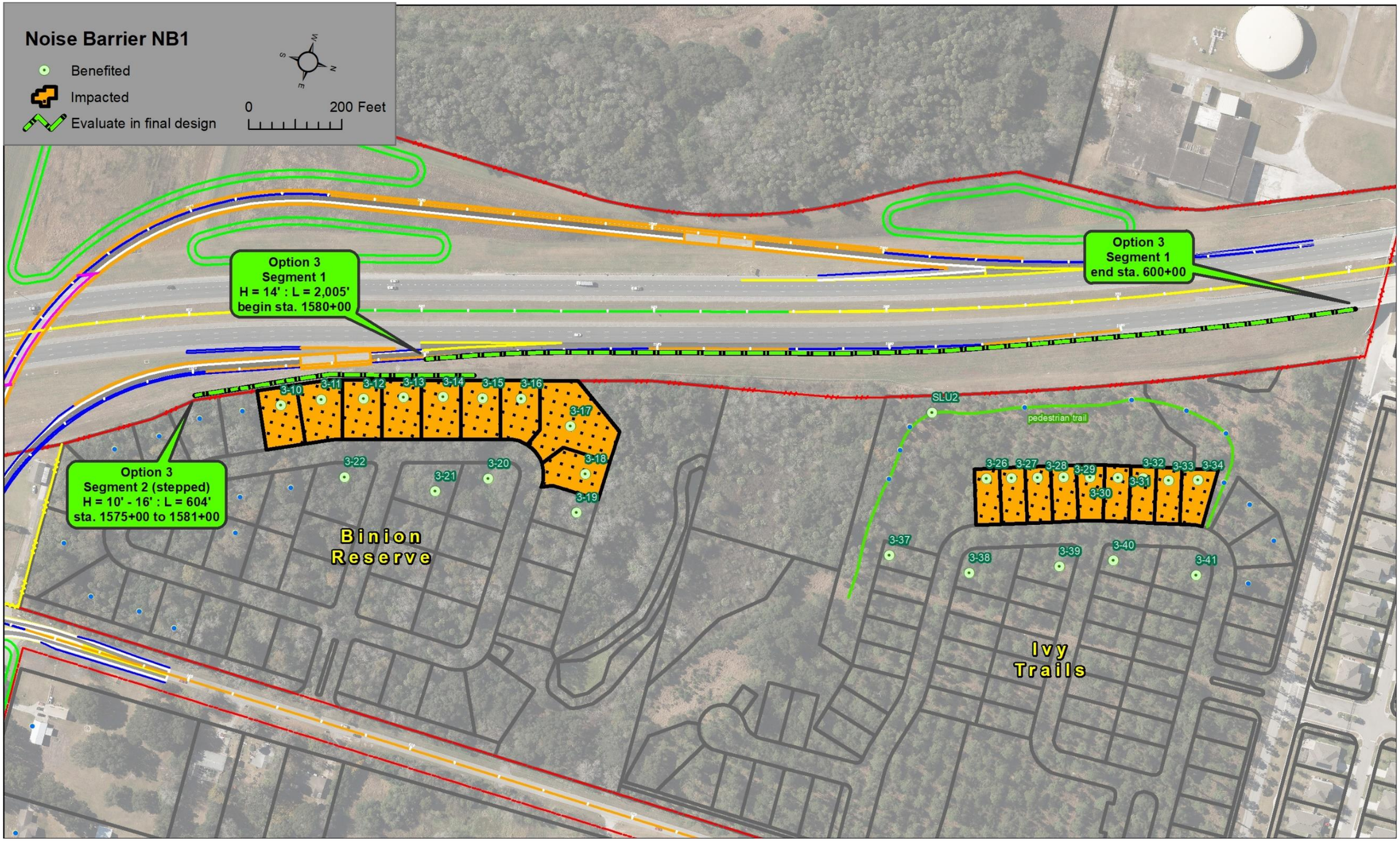

TOLL
429
Validation Site
Analysis Limits
3-1
3-2
3-3
3-4
3-5
3-6
3-7
3-8
3-9
3-10
3-11
3-12
3-13
3-14
3-15
3-16
3-17
3-18
3-19
3-20
3-21
3-22
3-23
3-24
3-25
SLU1
SLU2
pedestrian trail
3-26
3-27
3-28
3-29
3-30
3-31
3-32
3-33
3-34
3-35
3-36
3-37
3-38
3-39
3-40
3-41
3-42
Green English St
Lust Rd
Binion Reserve
(under construction)
Summerstone Loop
NSA 3
Ivy Trails
(under construction)
Binion Rd
Analysis Limits
2-9
2-10
CFX #429-309 PD&E Noise Analysis
Representative Receptor
Validation Site
N
S
E
0
200 Feet

Appendix E:

Noise Barrier Maps


Noise Barrier NB1
Benefited
Not Benefited
Impacted
Not Recommended
0
200 Feet
Option 1
end sta. 600+00
Option 1
H = 14' : L = 2,903'
begin sta. 1571+00
Binion
Reserve
Ivy
Trails
pedestrian trail
SLU2
3-10
3-11
3-12
3-13
3-14
3-15
3-16
3-17
3-18
3-19
3-20
3-21
3-22
3-23
3-26
3-27
3-28
3-29
3-30
3-31
3-32
3-33
3-34
3-37
3-38
3-39


Noise Barrier NB1
Benefited
Not Benefited
Impacted
Evaluate in final design
0
200 Feet
Option 2
end sta. 600+00
Option 2
H = 14' : L = 2,385'
begin sta. 1576+20
3-10
3-11
3-12
3-13
3-14
3-15
3-16
3-17
3-18
3-19
3-20
3-21
3-22
3-23
SLU2
pedestrian trail
3-26
3-27
3-28
3-29
3-30
3-31
3-32
3-33
3-34
3-37
3-38
3-39
3-40
Binion
Reserve
Ivy
Trails


Noise Barrier NB1
Benefited
Impacted
Evaluate in final design
0
200 Feet
Option 3
Segment 1
H = 14' : L = 2,005'
begin sta. 1580+00
Option 3
Segment 1
end sta. 600+00
Option 3
Segment 2 (stepped)
H = 10' - 16' : L = 604'
sta. 1575+00 to 1581+00
3-10
3-11
3-12
3-13
3-14
3-15
3-16
3-17
3-18
3-19
3-20
3-21
3-22
SLU2
pedestrian trail
3-26
3-27
3-28
3-29
3-30
3-31
3-32
3-33
3-34
3-37
3-38
3-39
3-40
3-41
Binion
Reserve
Ivy
Trails